

## Claims

What is claimed is:

- 5    1. A tunable, switchable electromagnetic filter comprising:
  - an electromagnetic resonator;
  - a switch coupled to the resonator and to ground;
  - an impedance element coupled to the resonator, wherein the resonator, the switch and the impedance element comprise a switchable filter;
- 10    a ferroelectric tunable component electromagnetically coupled to the switchable filter;
  - a tuning control signal generator for generating a tuning signal, coupled to the ferroelectric tunable component;
  - a switching control signal generator for generating a switching signal, coupled to the switch.
- 15    2. The filter of claim 1, further comprising a microelectrical mechanical switch.
3. The filter of claim 1, further comprising a voltage source coupled to the component.
4. The filter of claim 1, further comprising a ferroelectric capacitor.
- 20    5. The filter of claim 1, further comprising a voltage source coupled to the switch.
6. The filter of claim 1, further comprising a ferroelectric capacitor having a quality factor at about 1.9 GHz equal to about 50 or greater.

7. The filter of claim 1, further comprising a second resonator coupled to the first resonator and wherein the impedance element is coupled between the first and second resonators.
8. The filter of claim 7, further comprising:
  - 5 an input capacitor coupled at a first end of the input capacitor to an input port of the filter and at a second end of the output capacitor to the impedance element and the first resonator; and
  - 10 an output capacitor coupled at a first end of the output capacitor to an output port of the filter and at a second end of the output capacitor to the impedance element and the second resonator.
9. The filter of claim 8, further comprising a second tunable ferroelectric component coupled to the filter.
10. The filter of claim 9, wherein the impedance element, the input capacitor and the output capacitor comprise, respectively, a third, a fourth and a fifth tunable ferroelectric component.
- 15
11. The filter of claim 7, wherein the first and second resonators comprise monoblock resonators.
12. The filter of claim 1, wherein the filter resonates at a frequency between about 1850 MHz and about 1910 MHz.
- 20
13. The filter of claim 1, wherein the filter resonates at a frequency between about 1930 MHz and about 1990 MHz.
14. The filter of claim 1, wherein the filter resonates at a frequency between about 824 MHz and about 849 MHz.

15. The filter of claim 1, wherein the filter resonates at a frequency between about 869 MHz and about 894 MHz.
16. The filter of claim 1, wherein the filter resonates in a half wave mode.
17. The filter of claim 1, wherein the filter resonates in a quarter wave mode.
- 5 18. A method of modifying a resonant frequency of a filter comprising:
  - resonating a resonator in a first operating mode, the resonator being coupled to a MEMS switch;
  - generating a switching control signal;
  - switching a state of the MEMS switch, responsive to the switching control signal;
  - 10 changing a grounding condition of a port of the resonator, responsive to the state of the MEMS switch;
  - producing a second operating mode of a resonator, responsive to the grounding condition;
  - 15 generating a tuning control signal;
  - varying an impedance of a ferroelectric component, responsive to the tuning control signal;
  - adjusting a resonance frequency of the resonator, responsive to the impedance of the ferroelectric component.